

WHAT IS CLAIMED IS:

1. An apparatus for differentiating in a given area of tissue a tumorous tissue from a normal tissue, comprising:

electrode means for continuous or time-discrete measurement of tissue impedance over a range of tissue temperatures;

instrument means for effecting and monitoring said tissue temperatures; and

comparing said measured tissue impedance over at least a portion of the range of tissue temperatures with reference tissue impedance of the normal tissue adapted for tissue differentiation, wherein said reference tissue impedance is measured over said range of tissue temperatures.

2. The apparatus of claim 1, wherein said given area of tissue is breast tissue.

3. The apparatus of claim 1, wherein said given area of tissue is prostate tissue.

4. The apparatus of claim 1, wherein said given area of tissue is brain tissue.

5. The apparatus of claim 1, wherein said range of tissue temperatures is between 20°C and 45°C.

6. The apparatus of claim 1, wherein said range of tissue temperatures is between 20°C and about 38°C.

7. The apparatus of claim 5, wherein said instrument means further comprises a thermoelectric device using Peltier effect for achieving said range of tissue temperatures.

8. The apparatus of claim 7, wherein said thermoelectric device comprises elements of different electromotive potential conductively connected at a probe junction adjacent said

electrode means; and current means for passing an electrical current through said elements to reduce or raise temperature of said probe junction in accordance with the Peltier effect.

9. The apparatus of claim 5, wherein the instrument means for monitoring said tissue temperatures comprises a temperature sensor at about said electrode means of the apparatus.

10. The apparatus of claim 5, wherein the instrument means for effecting said tissue temperatures comprises radiofrequency heating and circulating a cooled medium inside said apparatus.

11. The apparatus of claim 6 further comprising cooling means for achieving said range of tissue temperatures between 20 and 38°C, wherein the cooling means comprises circulating a cooled medium inside said apparatus.

12. The apparatus of claim 1 further comprising treating means for delivering therapeutic drugs for treating the tumorous tissue at about said given area of tissue.

13. The apparatus of claim 1 further comprising treating means for delivering non-drug therapy for treating the tumorous tissue at about said given area of tissue, wherein said non-drug therapy is selected from a group consisting of chemotherapy, radiation, thermal energy, cryogenic energy, and combination thereof.

14. The apparatus of claim 1 further comprises an ultrasonic sensor with an ultrasound transducer having an outer layer, wherein the electrode means comprises said outer layer of the ultrasound transducer of said ultrasonic sensor.

15. The apparatus of claim 14, wherein the ultrasound transducer comprises an operating frequency up to 300 MHz.

16. An apparatus for differentiating in a given area of tissue a tumorous tissue from a normal tissue, comprising:

electrode means for continuous or time-discrete measurement of tissue impedance over a range of tissue temperatures;

instrument means for effecting and monitoring said tissue temperatures;

processing means for analyzing tissue impedance data over the range of tissue temperatures to obtain a first impedance-temperature derivative of the tissue impedance versus tissue temperatures; and

comparing said first impedance-temperature derivative at a tissue temperature of interest with reference first impedance-temperature derivative of the normal tissue at said tissue temperature of interest adapted for tissue differentiation.

17. The apparatus of claim 16, wherein said given area of tissue is selected from a group consisting of breast tissue, prostate tissue, and brain tissue.

18. The apparatus of claim 16, wherein said range of tissue temperatures is between 20°C and 45°C.

19. The apparatus of claim 16, wherein said instrument means further comprises a thermoelectric device using Peltier effect for achieving said range of tissue temperatures, said thermoelectric device comprising elements of different electromotive potential conductively connected at a probe junction adjacent said electrode means and current means for passing an electrical current through said elements to reduce or raise temperature of said probe junction in accordance with the Peltier effect.

20. A method of differentiating in a given area of tissue a tumorous tissue from a normal tissue, comprising:

a) advancing an apparatus to said given area, wherein said apparatus comprises electrode means for continuous or time-discrete measurement of tissue impedance over a range of tissue

temperatures and comprises instrument means for effecting and monitoring said tissue temperatures;

b) acquiring tissue impedance data over the range of tissue temperatures to obtain a first impedance-temperature derivative of the tissue impedance versus tissue temperatures; and

c) comparing said first impedance-temperature derivative at a tissue temperature of interest with reference first impedance-temperature derivative of the normal tissue at said tissue temperature of interest adapted for tissue differentiation.